

## 1. Introduction

\*No Deliverables\*

## 2. Plotting Color Matching Functions and Illuminants

1. Plot of  $x_0(\lambda)$ ,  $y_0(\lambda)$ ,  $z_0(\lambda)$  color matching functions

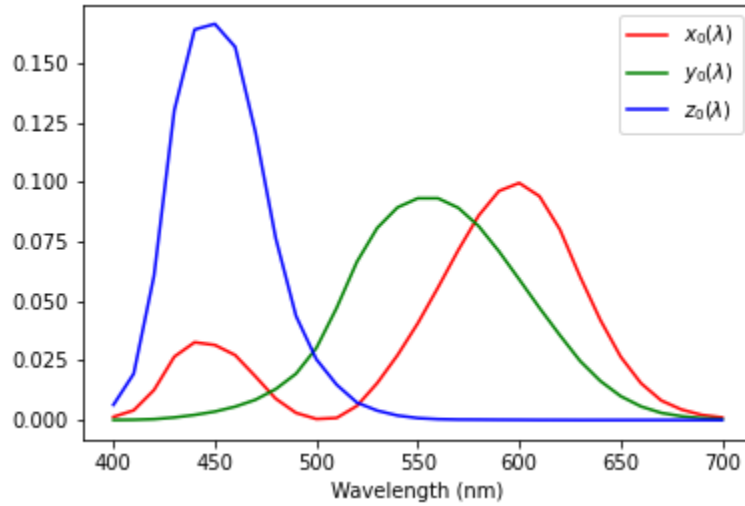


Figure 1:  $x_0(\lambda)$ ,  $y_0(\lambda)$ , and  $z_0(\lambda)$  vs  $\lambda$

2. Plot of  $l_0(\lambda)$ ,  $m_0(\lambda)$ ,  $s_0(\lambda)$  color matching functions

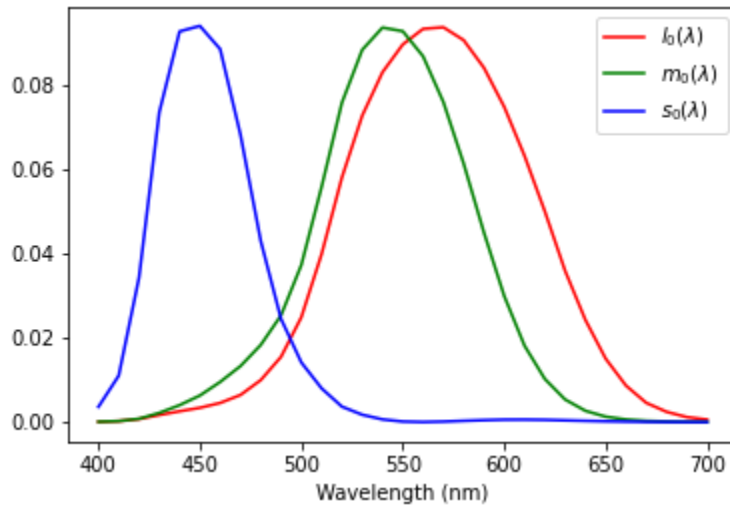


Figure 2:  $l_0(\lambda)$ ,  $m_0(\lambda)$ , and  $s_0(\lambda)$  vs  $\lambda$

### 3. Plot of $D_{65}$ and fluorescent illuminants

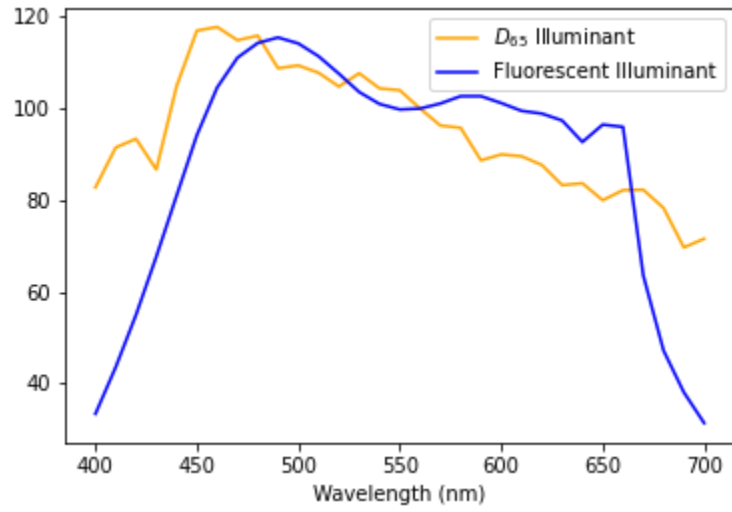


Figure 3:  $D_{65}$  and Fluorescent Illuminants vs  $\lambda$

## 3. Chromaticity Diagrams

### 1. Labeled chromaticity diagram

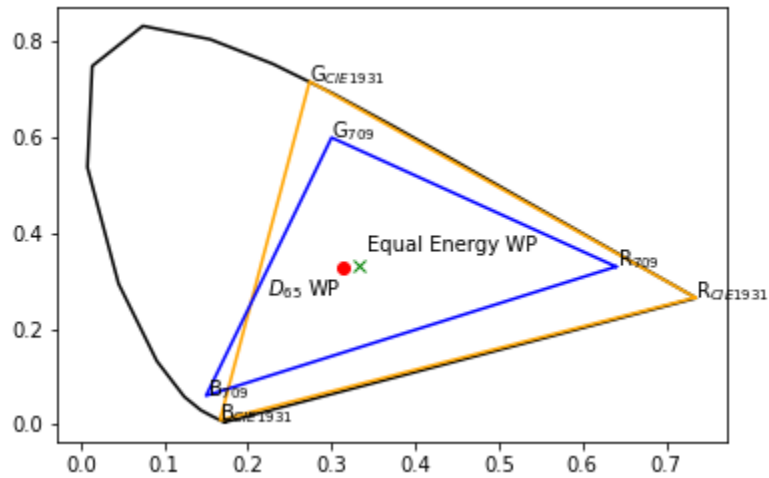


Figure 4: Chromaticity Diagram

## 4. Rendering an Image from Illuminant, Reflectance, and Color Matching Functions

1. Matrix  $M_{709\_D65}$

$$M = \begin{bmatrix} 0.4124 & 0.3576 & 0.1805 \\ 0.2126 & 0.7152 & 0.0722 \\ 0.0193 & 0.1192 & 0.9505 \end{bmatrix}$$

2. Two images obtained from  $D_{65}$  and fluorescent light sources

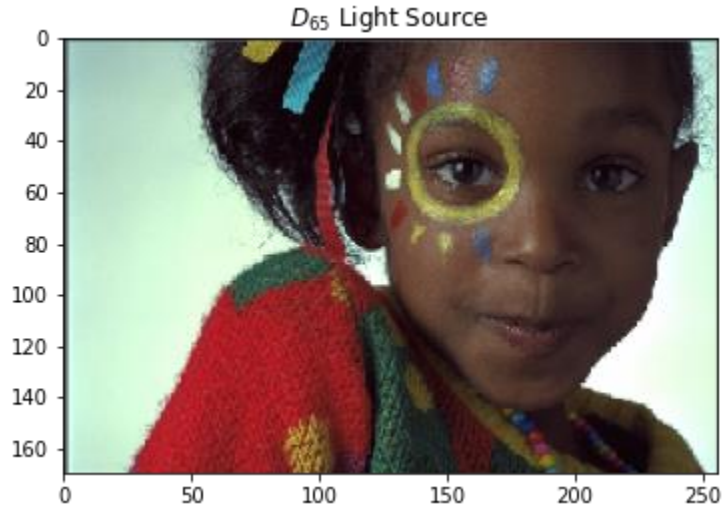


Figure 5:  $D_{65}$  Light Source Image Rendering,  $\gamma = 2.2$

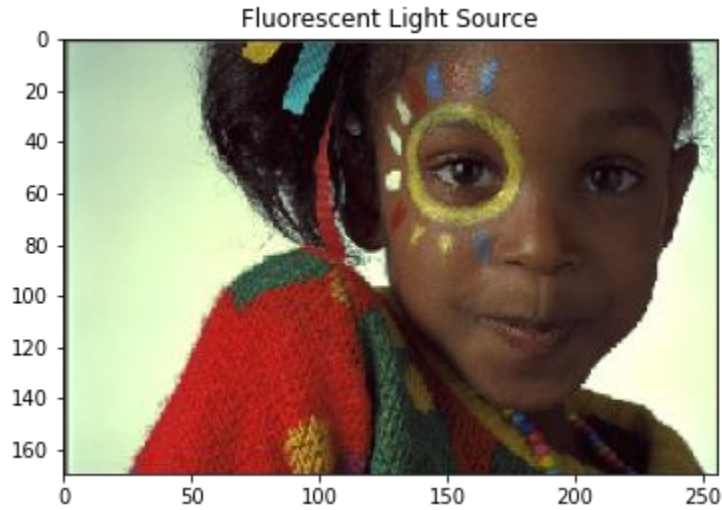


Figure 6: Fluorescent Light Source Image Rendering,  $\gamma = 2.2$

### 3. Qualitative description of the differences between the two images

The image rendered with the fluorescent light source appears brighter than the image rendered with the  $D_{65}$  light source. As a result, the girl's skin color and background appear more vivid in the second image. In addition, the red in the second image appears slightly more saturated than in the first. Subjectively speaking, the image rendered with the  $D_{65}$  light source appears more natural to the eye, whereas the image rendered with the fluorescent light source appears somewhat artificial as if it was processed in a photo editing software.

## 5. Color Chromaticity Diagram

### 1. Color diagram

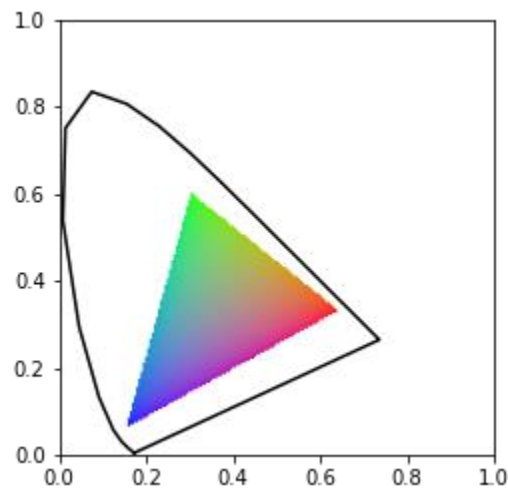


Figure 7: Color Chromaticity Diagram,  $\gamma = 2.2$